

Testimony of Dr. David Michaels
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Environment, Safety and Health
U.S. Department of Energy
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Environment, Safety and Health Issues at the
Paducah Gaseous Diffusion Plant in Paducah, Kentucky

INTRODUCTION

Thank you, Mr. Chairman. I appreciate the opportunity to present the results of the first phase of the independent investigation into allegations of environment, safety and health problems at the Paducah Gaseous Diffusion Plant (PGDP) in Paducah, Kentucky. As you know, Secretary Richardson committed to conduct a complete and independent investigation to determine if any of these allegations were true. He further committed to determine if workers were made ill because of inadequate worker protections and that if they were, to seek to provide them with fair compensation.

DOE is currently responsible for environmental cleanup of waste generated prior to 1993 when the facilities were leased to the United States Enrichment Corporation (USEC), and for the management of the inventory of depleted uranium hexafluoride (UF₆) stored at PGDP. This work involves approximately 94 employees of Bechtel Jacobs, the DOE current contractor for cleanup at the Paducah site, a transient subcontractor work force of up to 300 workers, and a small number of workers for USEC that support site cleanup or management of the inventory of depleted uranium hexafluoride. Uranium enrichment activities were transferred to USEC in July 1993 in accordance with the Energy Policy Act of 1992. Uranium hexafluoride and worker safety issues are covered under the authority of the Atomic Energy Act with oversight by DOE. USEC is subject to NRC regulation.

Because PGDP is a designated Superfund site, cleanup is being conducted in accordance with a Federal Facilities Agreement (FFA) among DOE, the Environmental Protection Agency, and the Commonwealth of Kentucky. This agreement establishes milestones and a schedule for meeting them. DOE and its contractors have managed the PGDP under the FFA since the mid-1980s, and the Paducah site is currently in compliance. The investigation found no immediate threat that would require cessation of all plant activities. The current risk to the public is not high, radiation exposures to employees have been low, and injury and illness rates at the Paducah site are lower than at many other DOE sites.

GENESIS OF THE INVESTIGATION

In May 1999, the Department became aware that a *qui tam* case would be filed under the False Claims Act in U.S. District Court. This suit alleges fraud on the part of contractors at the Paducah Gaseous Diffusion Plant, based on current and past environment, safety and health violations. Once the case was filed, it was placed under a court seal that prohibited DOE from acknowledging or discussing the case with any party outside the federal government. While the allegations could not be discussed, the Secretary felt it important to ensure that there were no imminent threats to the environment, public health or safety and sent a technical team of radiation safety professionals, health physicists and environmental engineers to conduct an on-

site review of the areas currently under DOE's control. No public dialogue could be initiated at that time because of the restrictions imposed by the court seal. In August, many of the allegations became widely reported in the national media and Secretary Richardson called for a comprehensive response to the public allegations. The court seal was subsequently lifted allowing the Department to publicly discuss its responses to the allegations.

Many of the concerns regarding worker safety and health stem from the presence of plutonium and other radioactive materials at PGDP and the question of whether workers were adequately informed or prepared to handle such materials. These materials resulted from the recycling of uranium from weapons production plants to the gaseous diffusion plants during the 1950s, 1960s, and 1970s. Concerns are focused on the transuranic elements and fission products that were and are present in this recycled uranium. It is estimated that approximately 100,000 tons of recycled uranium were processed at the Paducah plant.

Environmental concerns alleged in the suit include both on-site and off-site contamination from legacy radioactive or hazardous materials, and the potential for harm to workers or public health and safety. Allegations include:

- possible improper disposal of hazardous or radioactive materials both on- and off-site in publicly accessible areas;
- apparent inappropriate release of materials that were radioactively contaminated, release of contamination into site streams and drainage ditches, claims of inadequate control and posting of offsite contaminated areas, and
- suspected exceedences of radiological air emission standards.

CONDUCT OF INDEPENDENT INVESTIGATION

The comprehensive investigation into environment, safety and health (ES&H) concerns at PGDP is being conducted by a senior team of investigators and technical experts from my staff. The PGDP investigation will be followed by similar investigations at the other Gaseous Diffusion Plants in Oak Ridge, Tennessee and Portsmouth, Ohio. The PGDP investigation was divided into two phases so that we would be able to provide a timely assessment of the current state of environmental protection, and worker and public health and safety. The purpose of the first phase was to determine whether current work practices for those areas of the site that are the responsibility of DOE are sufficient to protect workers, the public, and the environment. The second phase is currently underway, and is evaluating environment, safety and health performance and concerns with historical plant operations from its inception through 1990. We expect that investigation to be complete in January, 2000.

The scope of the first-phase investigation included: facilities and properties under DOE jurisdiction; ES&H issues associated with these facilities and properties from 1990 to present, including interactions between DOE and stakeholders; and ES&H issues associated with uranium enrichment facilities from 1990 to 1997 — the point when NRC assumed regulatory oversight of the gaseous diffusion processes, facilities, and personnel. The DOE-controlled operations that were examined included: landlord infrastructure; legacy and newly generated waste treatment, storage, and disposal; site remediation; uranium hexafluoride cylinder storage; facility decontamination and decommissioning; and TCE and polychlorinated biphenyl (PCB) collection, treatment, and cleanup. The investigation did not examine areas leased by the United

States Enrichment Corporation (USEC) that are under Nuclear Regulatory Commission (NRC) jurisdiction.

The investigation team gathered information in a number of ways, including: interviewing personnel; observing work activities and performing walkdowns of facilities, work areas, and the site grounds; conducting groundwater, surface water, sediment, and soils sampling; conducting radiological surveys; and reviewing documents. More than 100 interviews were conducted with DOE Headquarters, Oak Ridge Operations and Paducah Site Office personnel; Bechtel Jacobs and subcontractor managers, supervisors, and workers; selected USEC personnel; and stakeholders. The team also reviewed hundreds of documents including plans, procedures, and assessments that provided perspectives on the assignment of roles and responsibilities, conduct of work activities, and the record of assessment findings.

The Investigation Team collected more than 30 samples from groundwater wells, surface water sources, sediments, soils, and from materials, equipment, and facilities. Samples were collected both inside the security fence as well as on DOE property that is outside the fenceline perimeter. These samples were evaluated for the presence of radioactive and non-radioactive contaminants.

Investigation Results

The team noted that a number of significant environment, safety and health improvements had been achieved since the early 1990s. Since the mid-1980s, steps have been taken to protect the public and mitigate the impact of radiological and chemical contamination, such as hooking up homes to public water. In the worker safety area, there have been enhancements to the radiation protection program, radiation exposures to employees have been low, and injury and illness rates at the Paducah site are lower than at many other DOE sites.

At the same time, the team identified a number of weaknesses in each of the areas reviewed. While the team found no immediate threat that would require cessation of site activities, it found the cumulative impact of the deficiencies to be a cause for concern and corrective action. The results of these evaluations are presented in three main categories — Public and Environmental Protection, Radiation Protection/Worker Safety and Health, and Line Oversight.

Public and Environmental Protection

Industrial operations at PGDP have produced large quantities of legacy materials that have been disposed of in landfills or burial grounds, released into the environment, or placed in long-term storage. Current DOE operations at PGDP focus primarily on the administration of programs to address these legacy materials and on infrastructure maintenance. The team found that cleanup plans and strategies have been developed in accordance with federal environmental regulations and the site is currently in compliance with the provisions of the Federal Facilities Agreement

Investigations conducted in 1990 and 1991 reported that the PGDP-contaminated offsite groundwater plumes are some of the largest in the DOE complex. Radiological and chemical contamination has spread from the site boundary into the groundwater and surface sediments, particularly into the Big and Little Bayou Creeks. Contamination continues to migrate from sources into the environment. Numerous locations of radiological and chemical contamination

have been discovered on DOE property both on-site (within the plant security fence), on the DOE property outside of the plant security fence, and in “offsite” areas now managed by the Kentucky Fish and Wildlife Service.

The plant has taken effective interim steps since 1990 to protect the environment and public health. Groundwater pump-and-treat efforts have helped to impede some of the highest areas of contamination, and alternate sources of water have been provided to residents with contaminated wells. These steps have slowed the spread of contamination from the site to the surrounding environment and reduced public risk, but contamination sources still exist, and the groundwater plume has continued to spread from the site. In addition, actions have been taken to control waste management activities at the point of generation and in the facilities subject to external regulation.

While the current risk to the public is minimal, the team determined that significant improvements are needed in environmental protection.

Findings:

1. Although the site is in compliance with the FFA, there has been limited progress in remediating and characterizing environmental contamination, low level waste, and stored hazardous materials produced by industrial activities. The meeting of major cleanup milestones under the Federal Facilities Agreement is jeopardized by inadequate funding. Work has been largely limited to characterizing contamination, operating and maintaining the site infrastructure, meeting regulatory requirements, and controlling the spread of contamination. Many of the areas of significant radiological and environmental contamination have been identified during past investigations and are the subject of existing compliance agreement.
- Most of the sources of contamination identified in 1991 still remain. Contaminated materials from burial grounds, old landfills, inactive waste lagoons, or spill sites identified in 1991 have not been removed or treated. Groundwater plumes containing trichlorethelene (TCE) and technetium-99 resulting from these source areas continue to propagate at one foot-per-day and now extend for over two miles.
 - Contaminated process buildings, shut down more than 20 years ago with no possible future use, have not been adequately maintained or removed. These buildings still contain hazardous materials and have been allowed to deteriorate; they are subject to animal infestation, broken windows, and leaking roofs, are not included in the current cleanup schedule, and are increasing in risk and cost to decommission.
 - A large volume of contaminated waste materials at Drum Mountain and scrap metal that has accumulated since the 1950s is stored outside. These areas continue to contribute contamination to the environment through surface water runoff and dispersion. The Federal Facilities Agreement requires removal of this material from Drum Mountain and beneath it by 2003, but current target funding levels threaten reaching this milestone.
 - An equivalent of 31,000 55-gallon drums of low-level waste are stored onsite at Paducah, much in containers that were not designed for long-term storage. Many of the containers stored outside are severely degraded, and some have leaked due to this degradation. Much of

this waste has yet to be fully characterized – only 157 cubic meters have been shipped from the site since 1990, and the schedule for completion of disposal has been delayed from fiscal year 2006 to fiscal year 2012.

- The 148 DOE Material Storage Areas (DMSAs) located across the site that contain large amounts of material that has yet to be characterized. These areas are not being managed pursuant to either the CERCLA or the RCRA .
- The nearly 37,000 uranium hexafluoride (UF₆) cylinders stored onsite in the open at the Paducah plant constitute a radiological exposure hazard and a potential threat to worker and public health in the event of fire and rupture. The Defense Nuclear Facilities Safety Board Recommendation to upgrade the condition and convert the UF₆ to a more stable form has been impacted by the cancellation of painting 1,400 cylinders due to funding constraints. Funds have not yet been appropriated for a UF₆ conversion facility.

2. There are continuing weaknesses in the radiation protection management of known environmental contamination areas by both Bechtel Jacobs and DOE. While the areas of most significant radiological contamination have been identified during past investigations, deficiencies in radiological characterization, posting, contamination control, and application of environmental as-low-as-reasonably-achievable principles remain. While these conditions don't present a current health risk, such weaknesses violate sound health physics practices. Some examples include:

- The full extent of radiological contamination on DOE property (both inside and outside the site security fence) has not been characterized. For example, at a recently identified area of contamination adjacent to a landfill, a radiologically-contaminated tar-like substance was discovered and subsequently covered and posted to control access. There is no documented listing or database of radiologically-contaminated areas other than what is included in the Solid Waste Management Unit listings, which are not maintained by the radiological control organization and do not clearly designate contaminants of concern for each Solid Waste Management Unit.
- Areas with levels of contamination that exceed Bechtel Jacobs radiological posting criteria were noted on DOE property at some distances beyond the site security boundary. Under the Bechtel Jacobs health physics procedures, these areas should have been posted as soil contamination areas with appropriate measures taken to prevent inadvertent entry. Some of these areas are currently posted with signage and wording that are the result of CERCLA Records of Decision or interim corrective measures, but these postings are not consistent and, in some cases, do not indicate presence of a radiological hazard. These areas are not posted or controlled in accordance with 10 CFR 835, Occupational Radiation Protection.

3. Not all groundwater contamination has been fully and adequately characterized. While DOE has made extensive efforts to characterize the major sources and the extent of groundwater contamination and has established a water policy to ensure that public receptors are adequately protected, some areas have not been fully characterized. For example, sufficient data are lacking on the leading edges of both the Northeast and the Northwest Plumes. The density and

positioning of monitoring wells are not adequate to assess the furthest movement or the discharge locations, such as streams, of the two northern plumes. The most recent plume map shows that movement has occurred under a portion of the Tennessee Valley Authority property, which borders the Ohio River.

4. Unclear assignment of responsibilities and lack of expertise have adversely impacted the understanding of environmental conditions. Neither DOE nor Bechtel Jacobs staff at the site have the requisite comprehensive knowledge of the nature of existing contamination in the various environmental media (surface water, sediment, soils, groundwater, and air). Sufficient technical personnel are not available to interpret the vast amounts of data associated with specific environmental disciplines.

5. Environmental information to the public has sometimes been delayed and is in forms not always clearly understood by the general public. Upon discovery of groundwater contamination in 1988, the site prepared a Community Relations Plan in response to CERCLA requirements. A review of current programs and activities to communicate information to the public identified a number of weaknesses, largely due to the lack of clearly defined roles and responsibilities for public communication. Annual environmental reports do not contain a clear summary of site conditions or public health risks. As a result, members of the public -- including the Site Specific Advisory Board -- have a perception that DOE does not adequately disclose information about hazards and risks.

Environmental Sampling Results

Environmental samples were collected and analyzed by the investigation team in an effort to confirm that the current analytical results being reported by the site are accurate and representative of environmental conditions. Site subcontractor personnel collected all the samples in accordance with approved procedures that follow EPA-established guidelines. The investigators witnessed the collection of all samples, and chain-of-custody forms were completed.

Groundwater samples were generally taken at the extremities of the reported plumes to confirm the extent of contaminant migration. Surface water samples were taken at major site outfalls flowing during the sampling period, and at points associated with surface waterways in the vicinity of the Plant. Soil and sediment were primarily sampled at outfalls and ditches near source areas of contamination. Groundwater, surface water, soil, and stream sediment were sampled and analyzed for key radionuclides and volatile organic compounds, including technetium-99, plutonium-239/240, neptunium-237, uranium-238, thorium-230, americium-241, and cesium-137, volatile organic compounds including trichlorethelene (TCE) and polychlorinated biphenyls (PCB).

Radiological and chemical contamination in groundwater, surface water, and soils/sediment were detected in some of the samples. With a few exceptions, the types and levels of contamination detected were consistent with the levels identified by past environmental monitoring conducted by the site, and do not pose a current public health or safety risk. The detailed results are provided and discussed in the investigation report

Groundwater. The oversight investigation team's groundwater sampling strategy involved sampling ahead of the plume in the direction of the plume movement in order to confirm the advance of the contamination. In a one-to-one comparison using previous data from the same wells, analytical results agreed with those in the site database and the chemical analyses of contaminants being reported by the site. Results indicate that the Northwest Plume is migrating northward through the TVA property.

Surface water. Surface water samples were collected from nine selected locations along the Little and Big Bayou Creeks as well as at several Plant Outfalls where surface water was present. Radioactivity analyses for surface waters showed relatively low concentrations for all isotopes, with the North-South Diversion Ditch sample showing the highest levels of uranium and technetium-99. Transuranic and thorium isotopes were either not detected or were present in very low concentrations, consistent with prior sampling results conducted by the site. The surface water results are all well below the levels required in the DOE Order 5400.5.

Soil. A total of eight soil/sediment locations were sampled for radionuclide and PCB contaminants adjacent to the site, and one was collected inside the site security fence near the Drum Mountain area. The magnitude of the radionuclide results was generally in keeping with historical data reported by the site.

Recommendations:

Radiological and chemical contamination from PGDP industrial activities have been released into the ground, soil, and air around the plant. These conditions have prompted DOE and regulatory organizations to take a number of steps to protect public health. Because of the limited duration of exposures of the public to contamination and the mitigation measures taken, DOE operations do not present a significant public health risk at this time.

Nevertheless, significant improvements in protection of the public and the environment are needed to avoid the possibility of a future health risk. Adequate funding and management emphasis on actual remediation activities are needed to address the sources of continuing contamination, to limit the degradation of contaminated buildings, and to control the continued spread of contamination pending cleanup. Exposure pathways need to be better characterized to fully document the technical basis and the site's conclusion that no significant public exposures to radiation sources, such as fugitive air emissions, are occurring. Site management also needs to improve the characterization of groundwater in several areas, such as the extent of progression of the Northwest Plume toward the Ohio River. Improvements in waste management practices are needed to address storage of materials in DMSAs and the degrading containers of low level waste.

Radiation Protection and Worker Safety and Health

The Bechtel Jacobs radiation protection program exists to protect individuals from radiological exposures that may occur as a result of DOE activities at the PGDP. These activities have changed during the 1990s as a result of the transition of gaseous diffusion operations to USEC. Despite the mission change, the nature, extent, and magnitude of contaminated facilities

at the site present unique challenges, and highlight the importance and need for a comprehensive and robust radiological protection program.

During the early 1990s, radiological assessments, including the 1990 Tiger Team, identified fundamental program weaknesses in the site's ability to control potential exposures to transuranics and to conduct an effective contamination survey program. In response, the site initiated a number of improvements. While the investigation team identified similar deficiencies to those raised by the 1990 Tiger Team report, the magnitude in areas such as postings, procedures, air monitoring, and contamination control is less. Records indicate that the external doses to employees from the types of radiation present at Paducah are very low, and there have been no recent significant intakes of radioactive material.

The identified radiological protection problems are typical of a site that has had to cope with the same legacy hazards for many years and which is no longer in operational mode. There has been increasing informal reliance on worker knowledge rather than a disciplined and rigorous application of controls such as detailed radiation work permits, procedures, postings, barriers, and air monitoring. These deficiencies, while not significant individually, are of concern in the aggregate because of the uncharacterized hazards remaining, the unique and challenging risks associated with future hazardous cleanup, and the reliance on subcontractors who do not possess the historical knowledge of site radiological and contractor hazards, including transuranics, and the applicable precautions and controls. The identified weaknesses in radiological controls are exacerbated by a lack of DOE or Bechtel Jacobs oversight of radiation work practices.

Findings:

1. Radiological characterization of the workplace is incomplete, weakening the ability of the radiological control organization to identify hazards and institute controls necessary to ensure consistent and appropriate radiological protection for workers. There is a lack of knowledge as to the isotopic mix of radionuclides present in various work areas. This information has never been obtained through comprehensive characterization nor is it available in technical basis documentation. Radiological Control Technicians need this information to establish proper radiological controls. Procedures in place for planning and conducting radiological controls in the workplace presume knowledge of radiological control personnel about the isotopic mix in work areas.
2. There is a lack of rigor, formality and discipline in the development, maintenance, and implementation of the Bechtel Jacobs radiation protection program.
 - Air sampler placement is not always consistent or adequate to sample the air in the work area or representative of the air breathed by the worker, and analysis of air samples is not timely. In many cases, the monitored work activity was already completed at the time final air sample activity was determined. Procedures do not identify those conditions that must be present to require isotopic analysis of air samples.
 - Radiological surveys taken by Bechtel Jacobs in April and June 1999 concluded there was no need for dosimetry and radiological worker training for construction personnel working at the UF₆ cylinder yard project. Subsequent dose rate measurements of the work area by the

Investigation Team indicated that, based on an anticipated six-month job duration, worker doses would likely exceed the threshold for such controls, and workers should have been monitored and provided Radiation Worker I training. The finding led to a shutdown of work, radiological training for two workers, and the implementation of monitoring through use of dosimeters.

- Bechtel Jacobs cannot adequately demonstrate that the unconditional release of equipment from the site, such as the release of fluorine cells, is consistent with DOE requirements. While Bechtel Jacobs does have a procedure for unrestricted release of equipment, this procedure was not applied during the process of releasing the fluorine cells.
- Outdoor contamination areas, particularly in the vicinity of Drum Mountain, were not adequately posted and barricaded for the levels of radiological contamination present. Other onsite areas, primarily drainage ditches, were posted as contamination areas without specific information on the radiological or chemical hazards being present. Since there is no contamination monitoring of individuals leaving the site, there is the potential for contamination to be taken offsite.

It is important that DOE and Bechtel Jacobs recognize that the cumulative deficiencies, in what has the potential to be a viable and effective radiological protection program, warrant management attention. The contractor needs to establish rigor, a higher level of discipline and formality to protect worker health and safety during hazardous characterization and cleanup activities on-site. DOE and Bechtel Jacobs also need to improve oversight of subcontractor radiological safety and performance including accountability for adherence to applicable DOE requirements.

Worker Safety

Bechtel Jacobs has developed procedures for identifying, evaluating and controlling occupational hazards at PGDP and most have been identified. Completion of the cleanup mission at PGDP, however, will require a significant increase in activities involving the potential for hazardous materials exposure including the removal of buried waste and the inspection of the contents of thousands of drums of radioactive waste. This work involves the handling of material containing radioactive and chemical carcinogens, much of which has not been fully characterized. There have already been several occurrences of workers being contaminated as a result of drum handling and waste characterization activities. Many precursor conditions are developing that, if not addressed, will lead to decreased safety performance and an increased risk to workers.

Findings:

1. Criticality safety deficiencies in DMSAs pose an unnecessary hazard to workers in surrounding areas. Large amounts of legacy materials for which DOE is responsible are currently stored in 148 DMSAs across the site, including DMSA 'islands' within USEC spaces.

- These materials are not yet characterized, and 11 contain potential fissile material deposits and are identified as high priority. As a result, the risk of an inadvertent criticality is not known. Funding has not yet been provided to correct the deficiencies in all the DMSAs and eliminate the potential criticality safety hazard.
2. Safety and health procedures are not consistently applied and followed, and in some cases, hazards are not adequately addressed by those procedures.
- Of the occurrence reports submitted to DOE by Bechtel Jacobs since April 1998, a number were attributed to either inadequate procedures or a failure to follow procedures. For example, on May 27, 1999, it was determined that laboratory personnel working in a mobile field extraction laboratory had been exposed to methylene chloride above the 15-minute Short-Term Exposure Limit as defined by Occupational Safety and Health Administration regulation.
 - The investigation team also observed that some safety and health procedures are not consistently followed. Sections of the site-wide procedure and the subcontractor's health and safety plan for confined space entry were not being followed at the L Cylinder Yard. Confined spaces were not evaluated, permitted, or posted in accordance with procedures. Sections of Bechtel Jacobs procedures on biological monitoring for industrial chemicals, and workplace air sampling were not being followed.
3. Bechtel Jacobs training programs do not ensure that all workers are knowledgeable of hazards and protection requirements, including those associated with transuranic contamination.
- The Bechtel Jacobs radiation safety training program does not include a process to assure that individuals have received the required training before working in controlled or radiological areas. Although required by procedure, mandatory training is not included in Radiological Work Permits.
 - None of the current Bechtel Jacobs radiation safety training modules adequately addresses the presence of transuranic contaminants at the site. Transuranic training was provided once in 1992, and although DOE and Bechtel Jacobs' personnel believed that transuranic training was being conducted, in fact, the 1992 transuranic-based training was not incorporated into the ongoing radiation worker training program. Bechtel Jacobs Radiological Control Technician training does not include monitoring for transuranics, the release criteria to be used, or the use of isotopic analysis information to determine the need for controls.

DOE Line Oversight

DOE established a Paducah site office in 1989 to provide program direction and day-to-day oversight of contractor activities. DOE strengthened this oversight office in the early 1990s, in light of emerging environmental and worker safety issues such as the discovery of Technetium-99 in offsite wells and numerous sources of contamination contributing to a plume of contaminated groundwater.

With the final transition to NRC regulation of the enrichment facilities in 1997, the scope of DOE activities at PGDP decreased significantly. In April 1998, DOE transitioned from a management and operating contract with Lockheed Martin Energy Services to a management and integration contract with Bechtel Jacobs. The current level and effectiveness of line management oversight of environment, safety, and health and assurance of compliance with DOE requirements is a matter of concern. Programmatic deficiencies identified through the 1990s either continue or have recurred. Direction provided by DOE, primarily the Oak Ridge Operations Office in writing or verbally, regarding implementation of the management and integration contract has significantly reduced the level of oversight conducted by both the Paducah Site Office and Bechtel Jacobs. Consequently, programmatic problems have not been identified and corrected by line management.

Findings:

1. DOE has not conducted effective oversight of ES&H to ensure that Bechtel Jacobs and its subcontractors effectively implement all DOE and regulatory requirements.
 - Oak Ridge has provided little written direction to the Paducah Site Office for oversight of the management and integrating contractor (Bechtel Jacobs). Written guidance stated that “the DOE role will center on establishing policies, standards, baselines, and objectives and measuring performance rather than focusing on day-to-day oversight and control.” Consequently “day-to-day oversight” has received little attention.
 - Neither Oak Ridge nor the Paducah Site Office has provided sufficient direction to Bechtel Jacobs to assure adequate oversight of subcontractors, although subcontractors are accomplishing an increasing amount of work.
2. Bechtel Jacobs has not conducted effective oversight of ES&H performance of its subcontractors to assure that subcontractors effectively implement DOE and regulatory requirements and are held accountable.
 - Bechtel Jacobs’ subcontractors do not consistently follow safety and health procedures. Numerous weaknesses were identified in the areas of procedure adherence, safe work practices, occupational medicine, and worker training. Some recent subcontractor work activities have resulted in unsafe work practices. Subcontractor prescreening by Bechtel Jacobs is not adequate to ensure the subcontractors have working programs in place that meet DOE requirements for Industrial Safety, Industrial Hygiene and Medical Surveillance.
 - Although Bechtel Jacobs provides a measure of oversight of subcontractor training programs through quality assurance audits, surveillances, and readiness reviews, the oversight is not consistently applied and is at the discretion of the Bechtel Jacobs Project Manager.
 - Planned reductions in staff within Bechtel Jacobs will further reduce Bechtel Jacobs’ technical capability to conduct oversight and surveillance of subcontractor activities. Planned staffing changes include a reduction in Safety Advocates from four to one, and

elimination of the training coordinator position. In addition, there are significant shortages in key safety disciplines, such as industrial hygienists.

Investigation Conclusions

There have been significant environment, safety and health improvements made at the Paducah site over the past ten years. Current operations do not present immediate risks to workers or the general public. At the same time, serious weaknesses remain in all major areas – environmental and public protection, worker safety and health, and DOE oversight that, in combination, undermine the confidence of workers and stakeholders and perpetuate the risks and hazards of legacy operations.

A key to regaining worker and public confidence, reducing hazards and risks to as low as reasonably achievable, and ensuring the continuing operation of the Paducah Plant, is to begin to accelerate progress in the cleanup effort, including compliance with impending initial major cleanup milestones including Drum Mountain and the waste buried beneath it. Systematic progress needs to be demonstrated in key cleanup and hazard reduction areas such as the elimination of the many sources of contamination, characterization and disposition of the DMSAs, the proper storage and shipment off-site of low level waste, and the removal of hazards and proper upkeep or demolition of shutdown hazardous facilities. Other areas where timely improvement is needed include:

- Establishing a high level of discipline and rigor in the radiological protection program and other programs affecting worker safety, such as criticality safety. Programs should include verbatim compliance with posting and barrier requirements, improved radiation work permits, comprehensive radiological training, strict procedure use and compliance, characterization of materials to improve effective hazards analysis, and the use of engineered hazard controls whenever possible.
- Strengthening communications and outreach to workers, the public, and the stakeholders to ensure understanding, confidence in site operations, and empowerment in contributing to cleanup strategies, priorities, and decisions. This is particularly important for the Site Specific Advisory Board whose charter is to contribute to site cleanup through involvement in establishing priorities and milestones and achieving public support.
- Improving DOE and contractor oversight of ES&H performance to ensure adequate subcontractor safety performance, accountability for compliance with DOE requirements, and continuous improvement.

Continued improvements in safety management will be particularly important as the Paducah Site initiates additional site cleanup and remediation activities. Such work presents unique hazards (e.g., handling material containing radioactive and chemical carcinogens that has not been fully characterized) and has already resulted in several occurrences of workers being contaminated in the limited remediation efforts to date. The need for effective safety management is further highlighted by the fact that, under the managing and integrating contractor concept, a large fraction of the potentially hazardous work will be performed by subcontractor employees, some of whom do not have a historical knowledge of site hazards or

controls. As subcontractor cleanup and waste management activities increase, increased surveillance and oversight will be needed by Bechtel Jacobs and DOE personnel who are knowledgeable of DOE requirements.

OTHER PADUCAH-RELATED ACTIVITIES

Determine Flow of Recycled Materials through the DOE Complex. DOE and its predecessor agencies produced more than 100,000 metric tons of recycled feed or waste streams containing trace quantities of fission products and plutonium. This material was sent not only to Paducah, but also to other sites in the DOE complex. Today, our understanding of where that material went is limited. Secretary Richardson requested a study that would provide a clear understanding of the flow and characteristics of this recycled material. DOE is concerned not only with the flow of this material, but also its characteristics such as the level of residual plutonium and fission products. The mass flow project will address the flow and characteristics of recycled uranium over the last fifty years. We expect this work to be complete by June 2000. The specific goals are to:

- Identify the mass flow of recycled uranium throughout the DOE complex from early production to mid-1999 and create a publicly available unclassified inter-site flowsheet.
- Identify the characteristics of, and contaminants in, the major uranium streams, including the technetium, neptunium, plutonium or other radioactive content of concern to worker or public health and safety.
- Conduct site mass balance activities to identify any significant concern for potential personnel exposure or environmental contamination.

Worker Exposure Assessment Project. Secretary Richardson has committed to fully address health concerns of current and former Paducah workers, especially where records are less than complete, or where worker exposure to plutonium and other materials has not been well characterized. To address this gap, an aggressive and exhaustive search of records is being conducted at Paducah for the time period ranging from the early 1950s to the present. Assessments will then be performed by analyzing the exposure records of current and former workers to determine the extent and nature of exposures, focusing on exposure to transuranics. The activity will include identifying, retrieving and reviewing exposure records. Should records prove to be poor or non-existent, DOE would perform detailed reviews of relevant plant process and monitoring data as well as extrapolations based on available exposure information.

The goal of this effort is to establish the potential ranges of worker radiation exposures and identify, document and communicate the radiological issues that may have affected worker health at the Paducah site since its opening. This work will help inform Paducah workers of their potential radiation exposure and will help determine whether there may be any potential for adverse worker health impacts from radiation exposure while working at the Paducah plant. We are currently investigating the conduct and cost implications of similar exposure assessments at Portsmouth and Oak Ridge.

CONCLUSION

Finally, Mr. Chairman, I want to emphasize that Secretary Richardson, on behalf of the entire Administration, takes the concerns that have been raised seriously and is committed to investigate and resolve them. The investigation is both independent and comprehensive. As you have seen, it has already begun to serve to get out the facts and correct any current safety shortcomings. The existing environmental compliance agreement that guides remedial actions and schedules at the site has been agreed to by DOE, the State of Kentucky and the Environmental Protection Agency. Where the investigation team's initial observations suggest that modifications to this agreement, including adjustments in priorities, may be warranted to protect the public and worker health and safety, we will pursue them.

We need to determine how well the workers knew of and understood the hazards they were working with, and how well they were protected from these hazards -- even in very small amounts. We will learn much more as our investigation moves ahead and seeks to confirm -- in today's regulatory environment -- whether the presence of these materials represented a potential health risk at Paducah or any other DOE plant.

We will continue our efforts in a manner that is forthright and responsive to the public's need for timely information, while at the same time being careful that our answers are correct. We will also continue to work in a cooperative and transparent way with the workers, their representatives, the public, and the Congress. Secretary Richardson has made it clear that the days of secrecy and hiding information are over. We are committed to getting accurate information and doing so in a responsible manner. We are also committed to treat our workers dignity and with fairness.

Thank you for the opportunity to testify. I would be happy to answer questions from any of the Subcommittee members.